

GIS-Based Tools for Water and Waste Water Modeling

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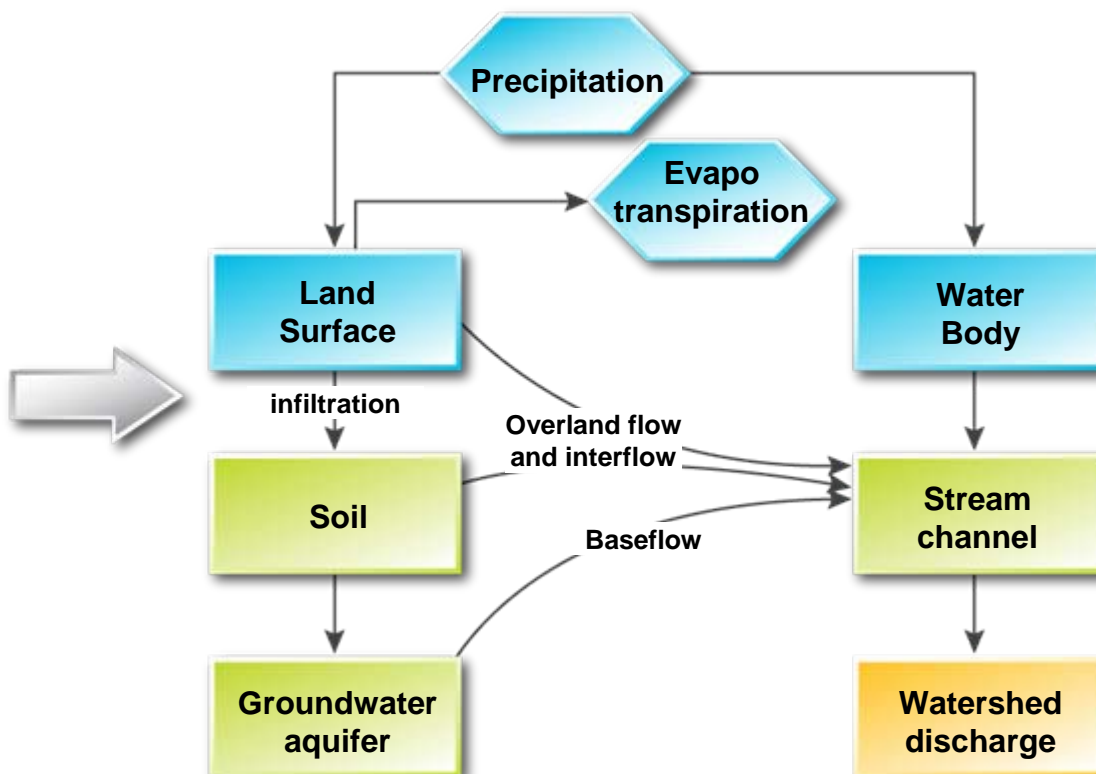
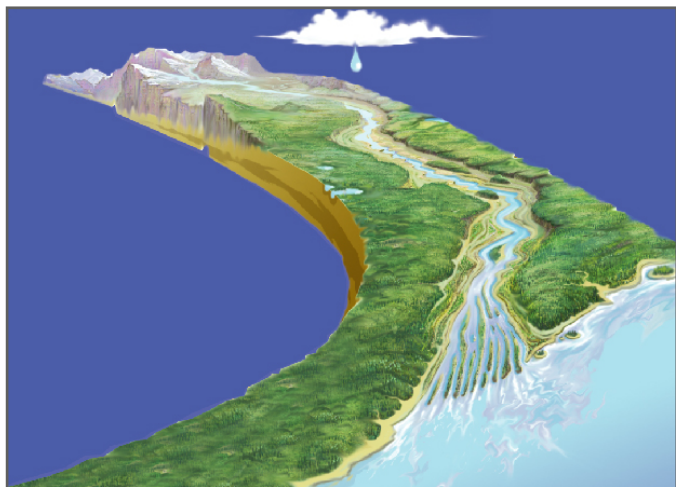
EPA Environmental Information Symposium
Phoenix, Arizona
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Introduction

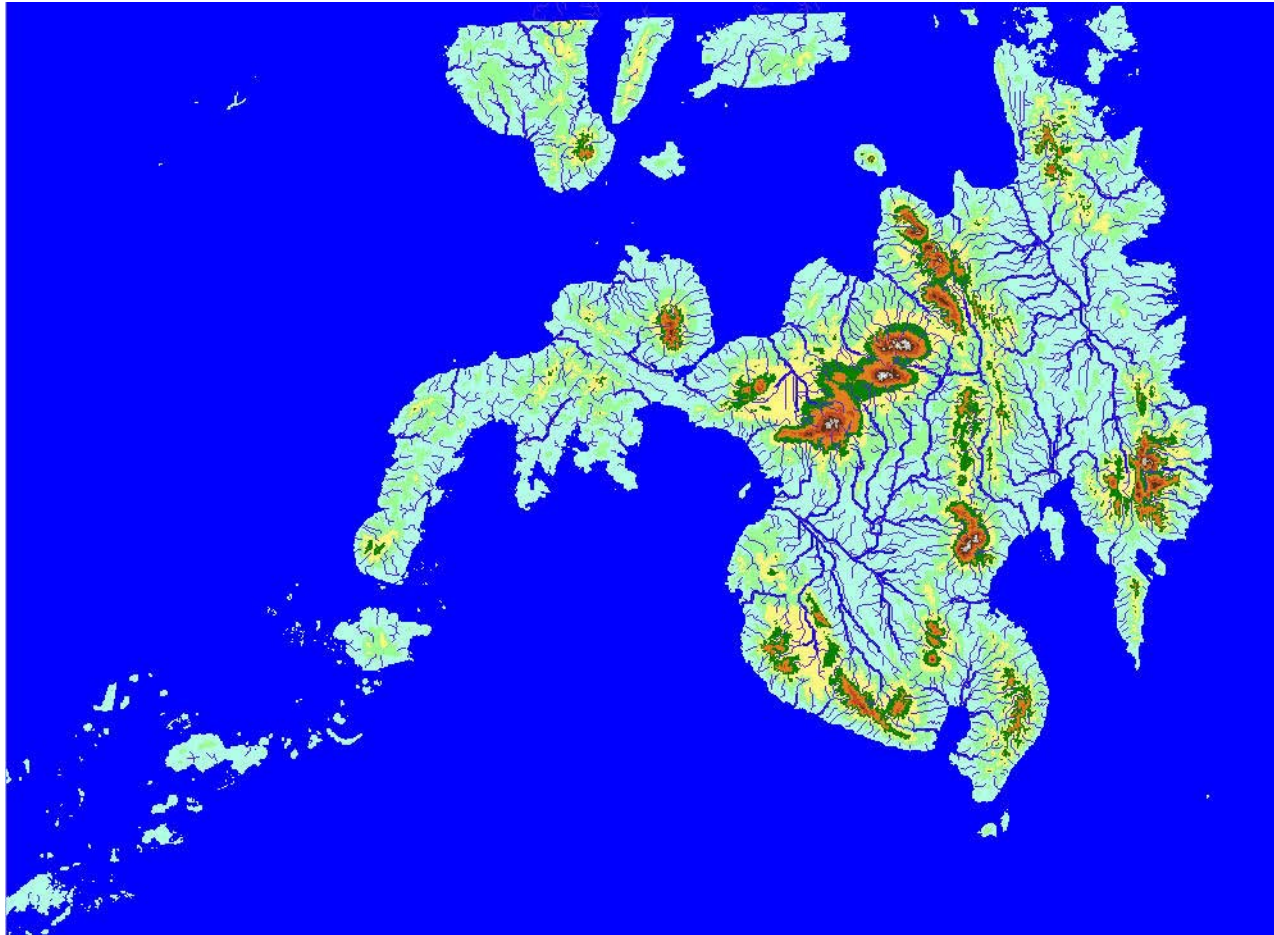
- Stream Flow Modeling
- Integrated Water and Waste Water Systems
 - Drinking Water
 - Storm/Waste Water
 - Surface Water

Geospatial Stream Flow Model

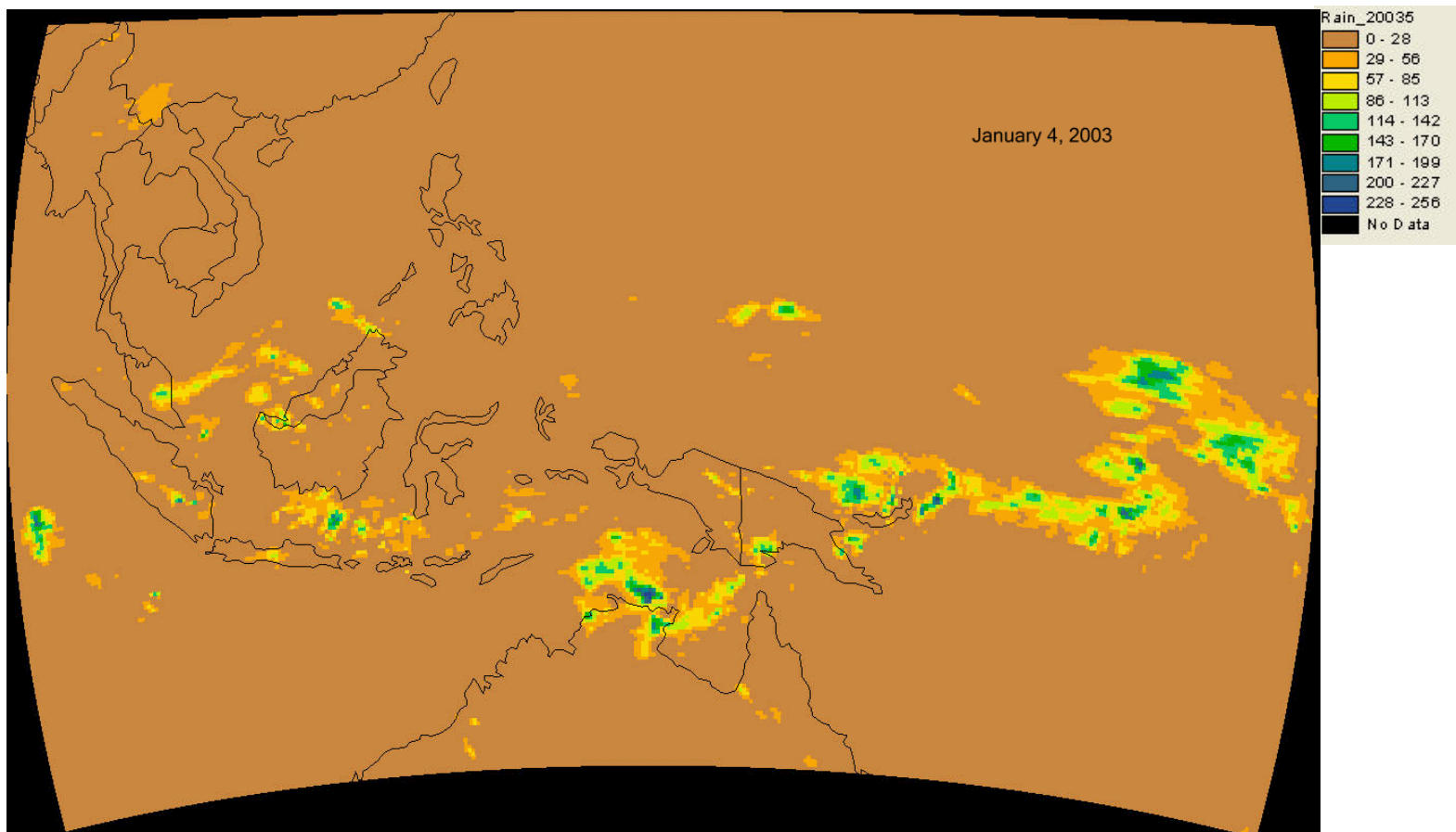
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River Network Derived from Shuttle Radar Topography Mission Terrain Elevation Data

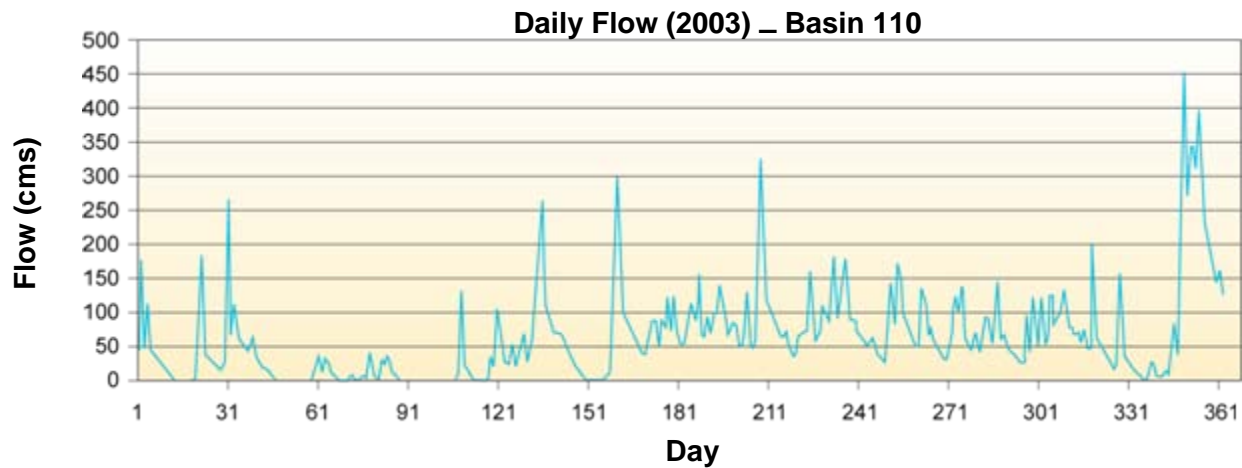
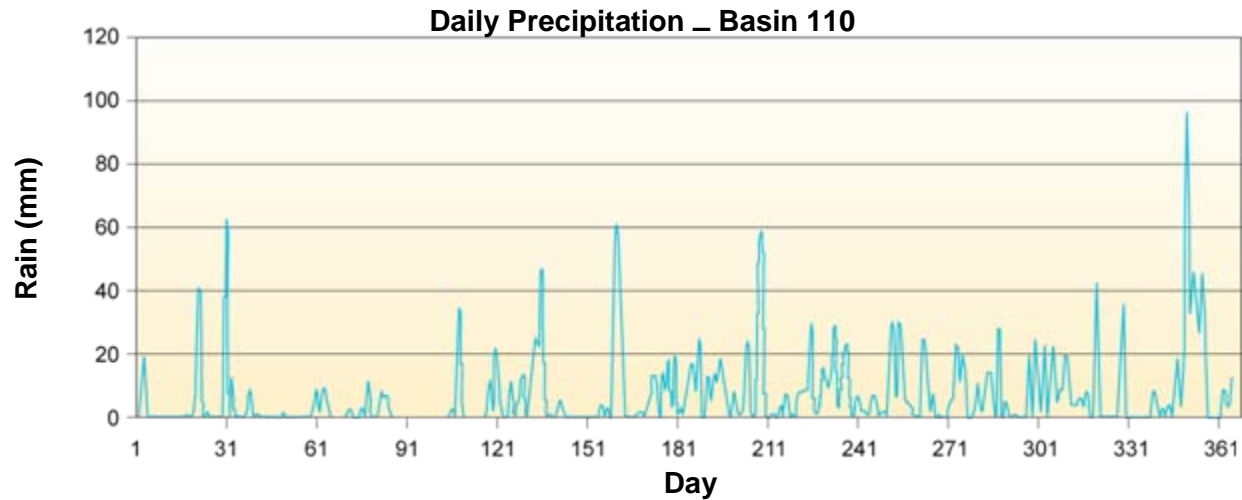


Satellite Derived Rainfall



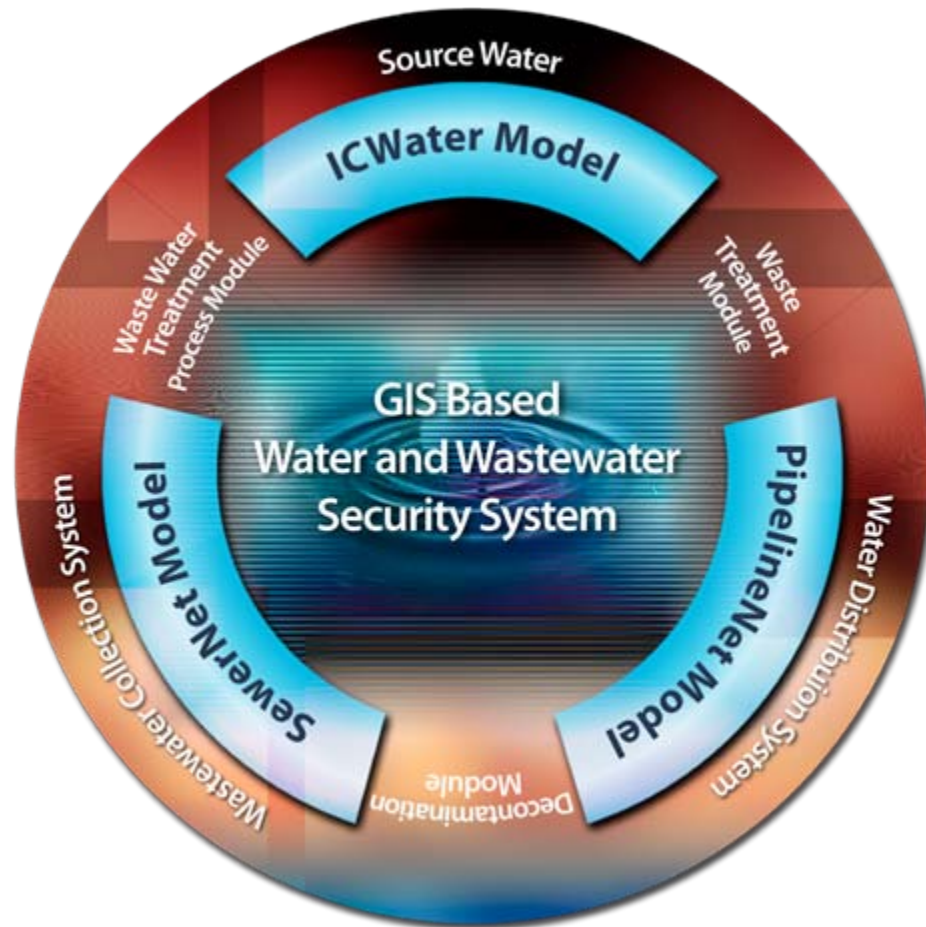
Precipitation and Stream Flow

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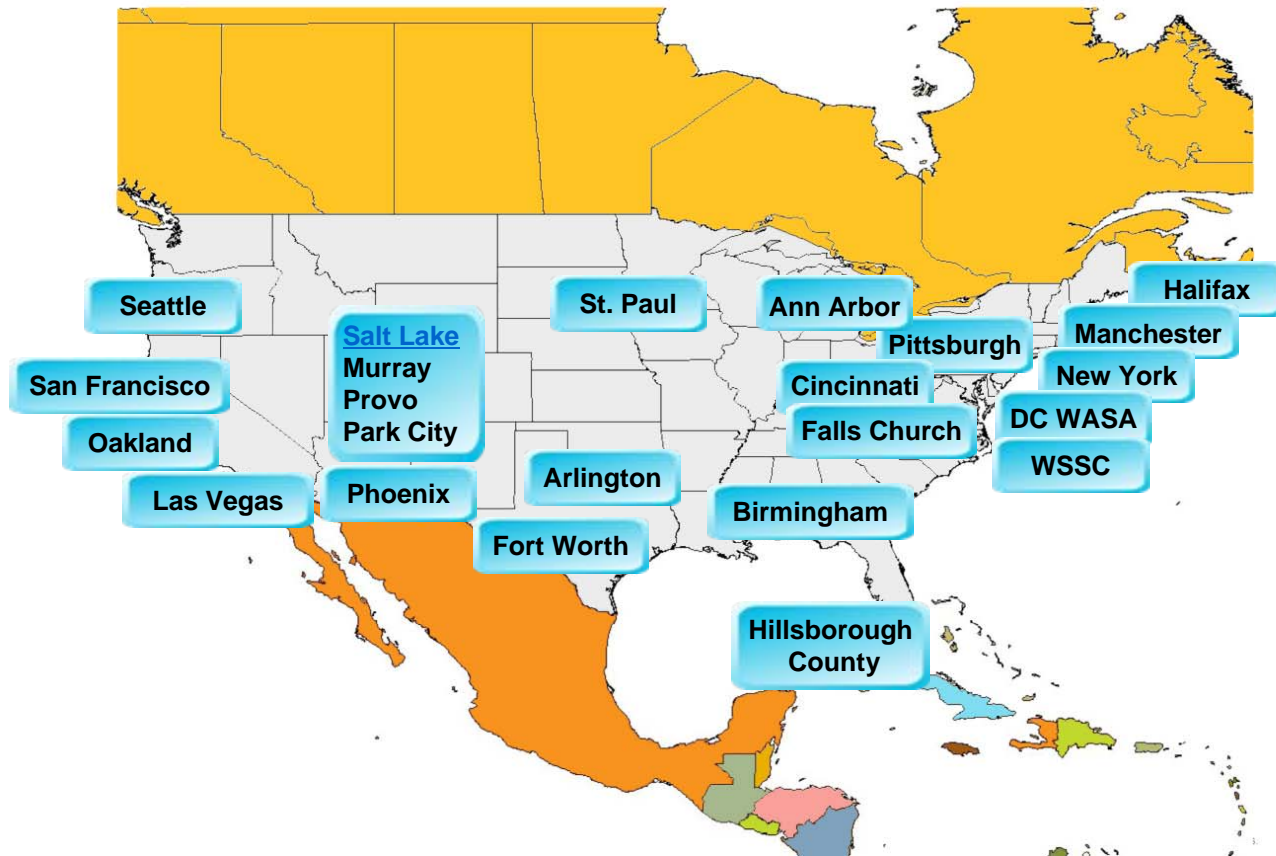
Integrated Water and Wastewater Systems

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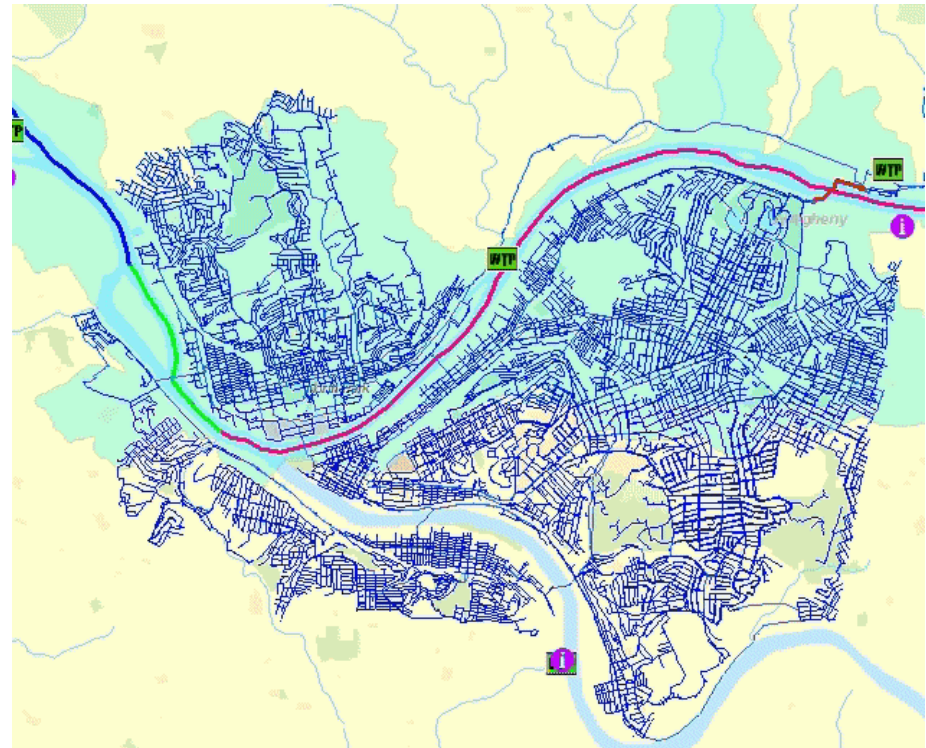
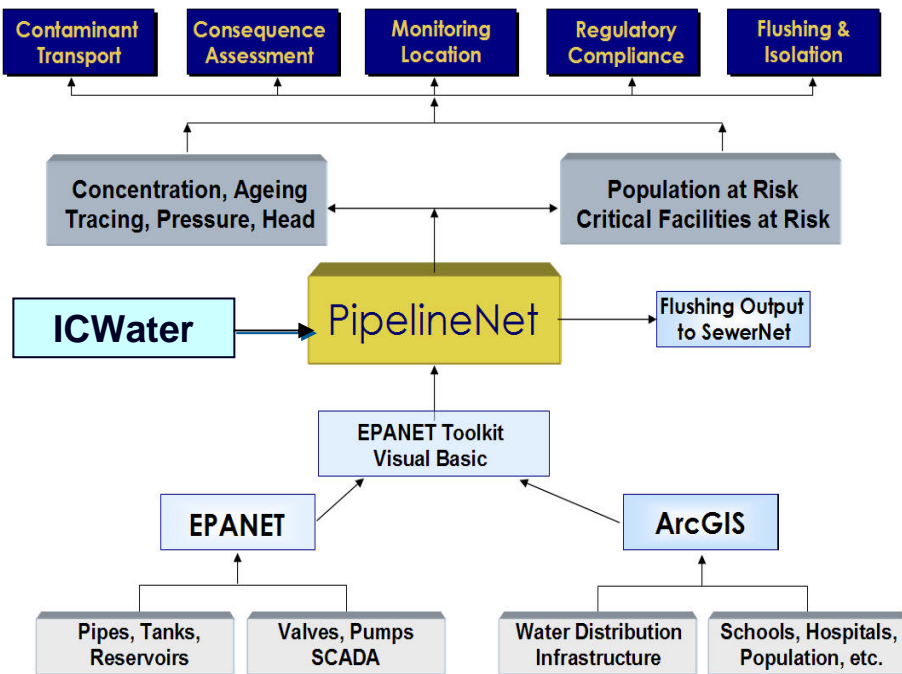


PipelineNet/SewerNet Cities

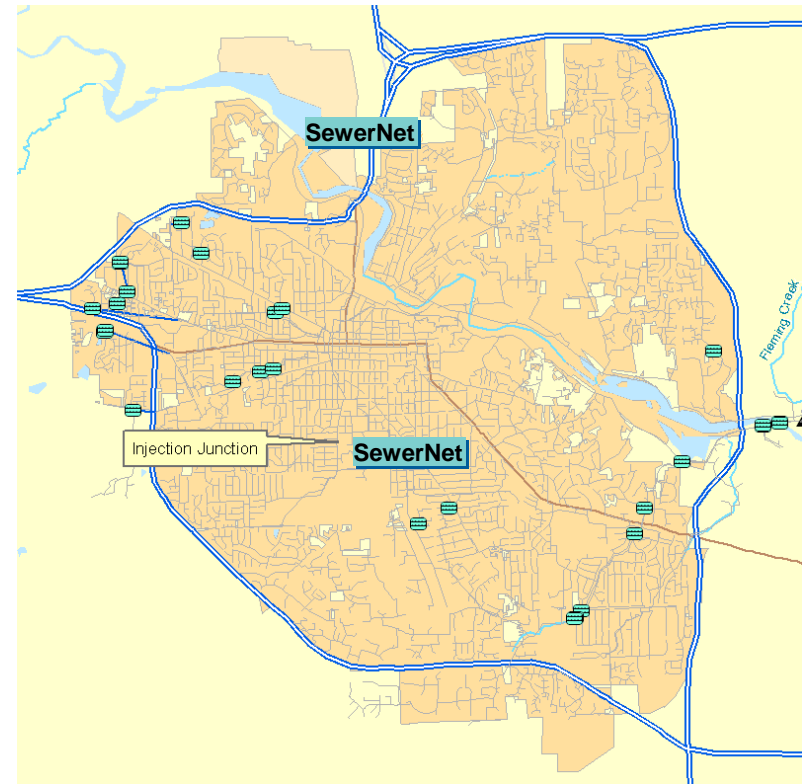
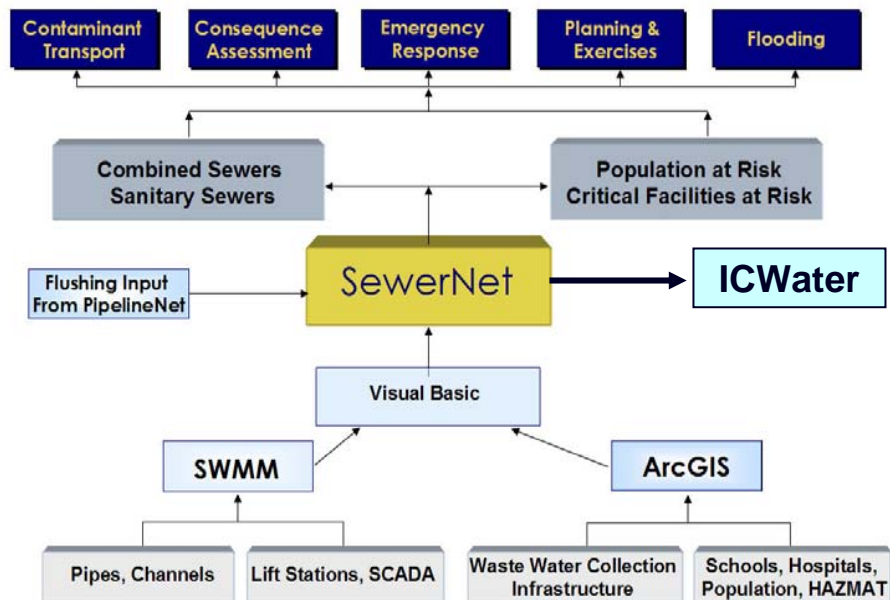
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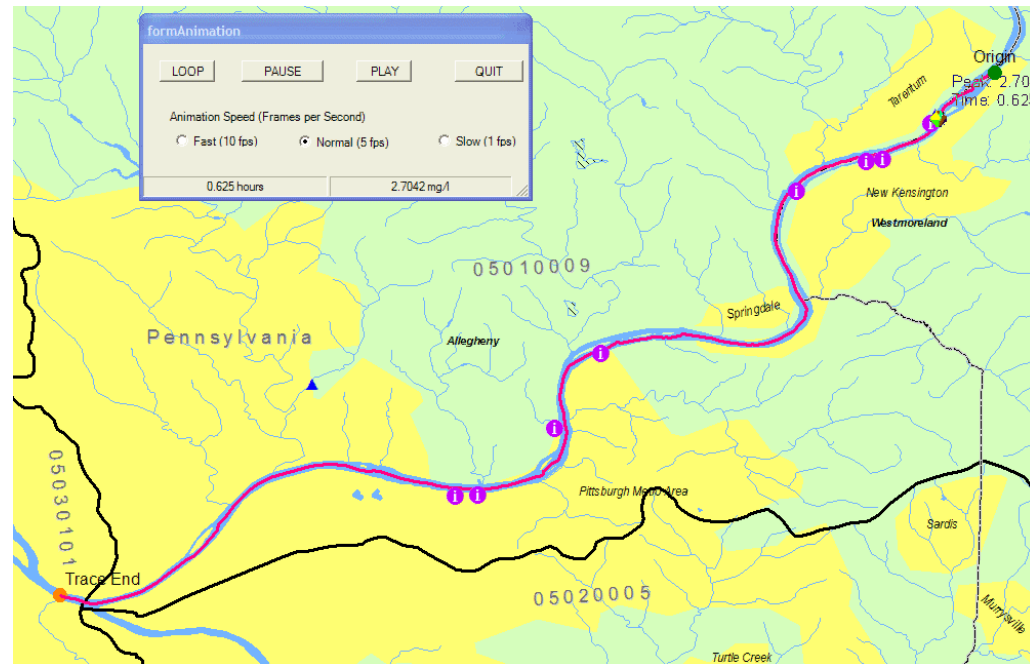
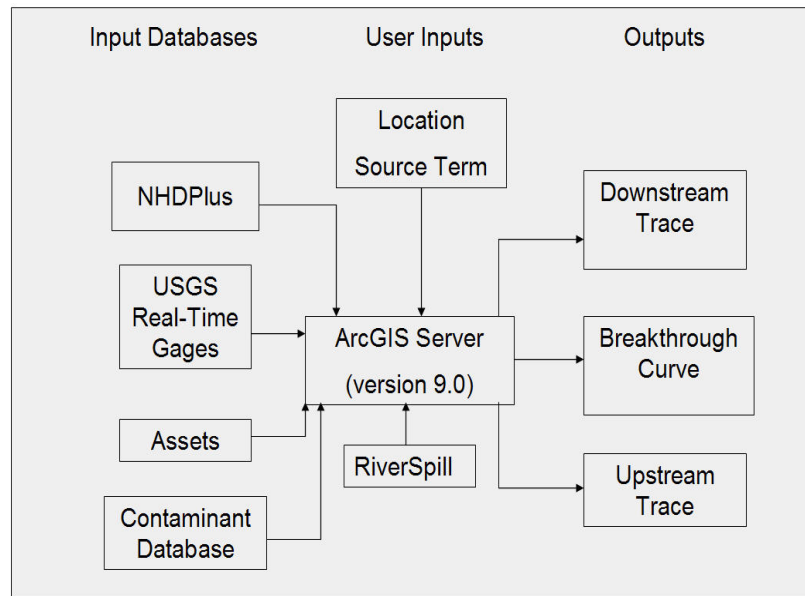
PipelineNet



SewerNet



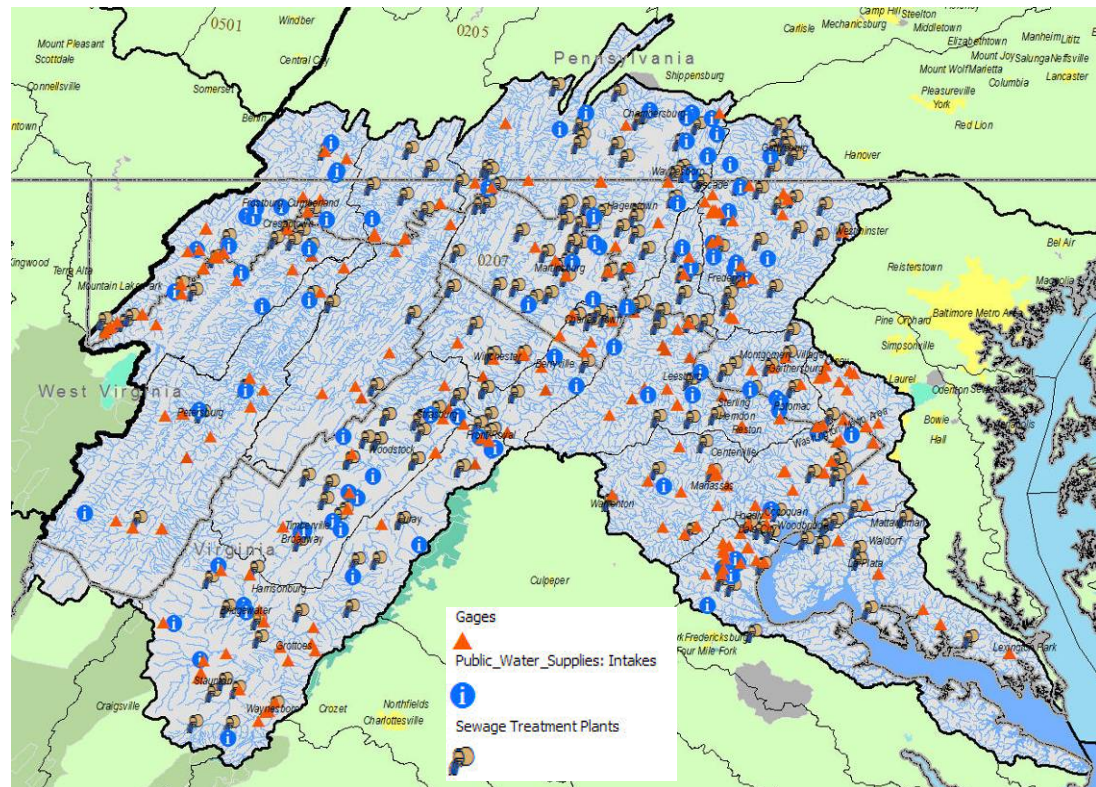
ICWater Architecture



ICWater Components



- National Hydrography Dataset
- Real-Time Stream Flow
- Agent Database
- ARCGIS
- RiverSpill Model
- Asset Databases

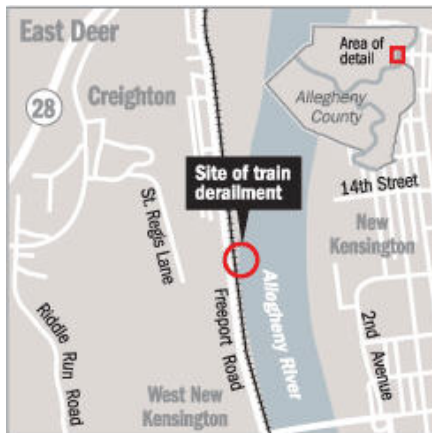
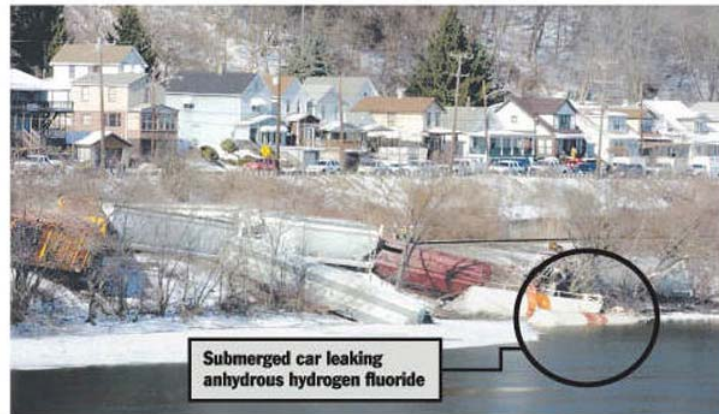


Demonstration



Derailed train leaks toxic chemical

A Norfolk Southern freight train derailed in East Deer Township early yesterday, causing officials to evacuate about 200 residents of the Creighton section of the township. Thirteen cars of the 83-car train derailed, and two tankers were pushed into the Allegheny River, one of them almost completely submerged. That car is leaking **anhydrous hydrogen fluoride**.



The substance:

Anhydrous hydrogen fluoride

Hydrogen fluoride, a strong inorganic acid, is produced and used as a gas or liquid without water (i.e., in anhydrous form), or in a water (aqueous) solution. The anhydrous form is potentially more hazardous because AHF has greater potential for fuming and forming vapor clouds. EPA stresses that although mishandling of HF can cause harm, there is no cause for undue alarm about its presence in the community when it is properly and safely managed.

Inhalation of hydrogen fluoride vapor can cause irritation if the exposure is mild (i.e., low concentration in air for a

AHF is a colorless, fuming liquid or gas with a strong, irritating odor. Although comparatively weak compared to other gases and acids, it can still produce serious health effects in a variety of exposures.

short time), or severe damage to the respiratory system or death in the case of exposure to high concentrations.

The largest use of hydrogen fluoride is in the manufacture of fluorine-containing chemicals, particularly chlorofluorocarbons (CFCs). Hydrogen fluoride may be used in some petroleum refinery operations, aluminum production, nuclear applications, glass etching and polishing and metal treating and cleaning.

Integrated Models



Integrated Network-Based Modeling for Water and Wastewater



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Many of the streams and rivers in the U.S. are sources for drinking water. Water from these surface sources are processed and distributed through pipelines throughout cities and suburbs. Wastewater is gathered with a second set of pipelines and treated; and, with the rain waters that wash buildings, malls and streets, is disposed of in the same streams and rivers. The streams and rivers and treatment and pipeline systems are each critical elements of water infrastructure. Three hydraulic GIS (Geographic Information System) applications are presented which represent the water infrastructures of cities and urban areas and U.S. streams and rivers. The water infrastructures include drinking water distribution systems, wastewater collection systems and source water.



ICWater, PipelineNet and SewerNet have been developed for use in planning, response, training and development of monitoring strategies to address potential deliberate or accidental toxic contamination events.

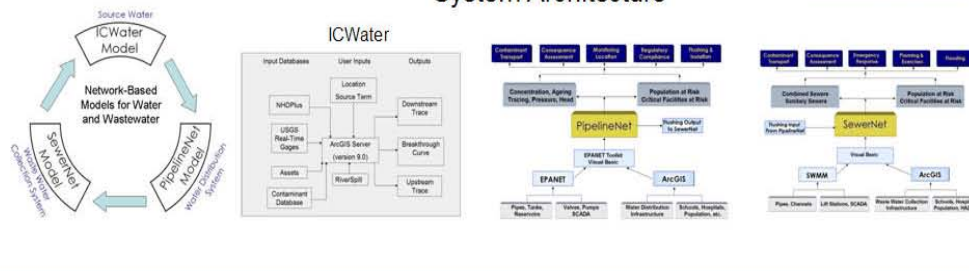
The applications include information related to potential sources of toxic substances, transportation networks, schools and hospitals, and the populations at risk. The applications are currently functional for more than twenty five cities and for all U.S. streams and rivers.

Elements of the water infrastructure are hydrologically connected allowing for an examination of such matters as disposal of contaminated drinking water, contamination of streams and rivers from untreated wastewater and forensic analyses.

Export to Google Earth



System Architecture



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Modeling....

Applying Appropriate Modeling Solutions to Watershed Management
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RiverSpill & PipelineNet Brochures
[more](#)

Integration....

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Bibliography....

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Integrated Water & Waste Water Security System
This system addresses three program areas: (1) Source Water, (2) Water Distribution Systems, and (3) Waste Water Collection Systems.

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Environmental Bulletin, Spring 2004
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18th Annual Virginia GIS Conference, Sept. 24-25 2007
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